

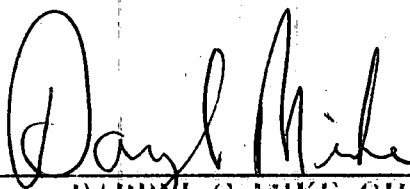
SITE-SPECIFIC
HEALTH AND SAFETY PLAN
FOR
THE NL/DUTCH BOY PAINTS SITE
PERTH AMBOY, NEW JERSEY

Submitted to:

NL INDUSTRIES, INC.
HIGHTSTOWN, NEW JERSEY

Prepared by:

OHM Remediation Services Corp.



DARREL C. MIKE, OHST
SAFETY SUPERVISOR

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Proposal # 0105108.1

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) documents the policies and procedures which protect workers and the public from potential hazards posed by work at this site. OHM considers safety the highest priority during work at a site containing potentially hazardous materials and has established a standard policy of zero exposure which must be upheld on all projects. All workplan activities will be conducted in a manner that minimizes the probability of injury, accident, or incident occurrence. The Site Safety Plan Certification (Appendix A) will be signed by all who actively participate at this project.

Although the plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Conditions may change and unforeseen situations may arise that require deviations from the original plan. This flexibility allows modification by the OHM supervisors and health and safety officials.

1.1 SITE HISTORY

The Custom Distribution Services, Inc. (CDS) Facility is located at 1050 State Street, County of Middlesex in Perth Amboy, New Jersey. Until 1979 the facility was owned by NL Industries, Inc. (NL). During periods of NL ownership, the facility accepted scrap metal and spent batteries for smelting.

The facility is located in a mixed land use area and is presently owned and operated as an industrial park by CDS. The Industrial Park consists of approximately fifteen (15) buildings which are used for various businesses which include Manufacturing, Storage, Recycling and Trucking.

The "Site" of work covered by this HASP is defined in the March 1993, Administrative Order of Consent between NL Industries, Inc. and the USEPA Region II.

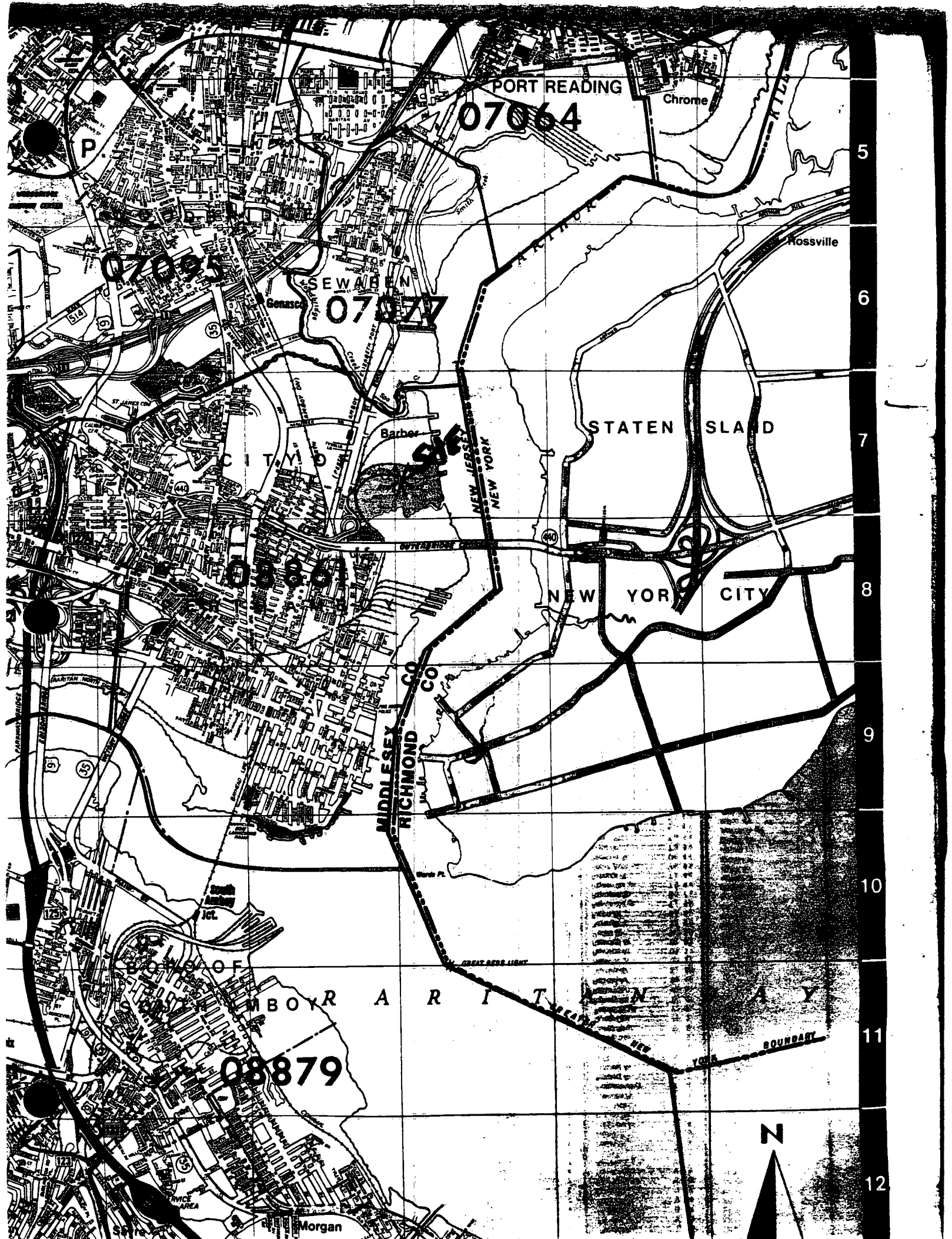
The activities describes below will serve as a outline for work to be performed on Site, See OHM Work Plan for detailed description.

SCOPE OF WORK

- Premobilization Activities
- Mobilization
- Site Preparation
- Container Consolidation and Sampling
- Soil Areas of Concern
- Transformer Removal
- Asbestos Removal
- Transportation and Disposal
- Cleanup
- Demobilization

Figure 1.1, Site Map





2.0 KEY PERSONNEL AND MANAGEMENT

The Project Manager (PM), Site Supervisor (SS), Certified Industrial Hygienist (CIH) and Site Safety Officer (SSO) are responsible for formulating and enforcing health and safety requirements, and implementing the HASP.

2.1 CERTIFIED INDUSTRIAL HYGIENIST

The CIH will be responsible for the contents of the HASP and will ensure that the HASP complies with all federal, state and local health and safety requirements. If necessary, the CIH can modify specific aspect of the HASP to adjust for on-site changes that affect safety. The CIH will coordinate with the SSO on all modifications to the HASP and will be available for consultation when required. The CIH will not necessarily be on site during OHM activities.

2.2 SITE SAFETY OFFICER

The SSO has responsibility for administering the HASP relative to site activities, and will be in the field full-time while site activities are in progress. The SSO's primary operational responsibilities will be monitoring, including personal and environmental monitoring, personal protective equipment maintenance, and assignment of protection levels. The SSO will be the main contact in any on-site emergency situation regarding Employee safety issues. The SSO will direct all field activities involved with safety and be responsible for stopping work when unacceptable health or safety risk exists. The SSO is responsible for assuring that all on-site personnel understand and comply with all safety requirements.

2.3 PROJECT MANAGER

The PM has the overall responsibility for the project and to assure that the goals of the construction remedial action are attained in a manner consistent with the HASP requirements. The PM will coordinate with the SS and the SSO to assure that the remedial action goals are completed in a manner consistent with the HASP.

2.4 SITE SUPERVISOR

The SS is responsible for field implementation of the HASP. The SS will establish and ensure compliance with site control areas and procedures and coordinate these supervisory responsibilities with the site SSO.

2.5 EMPLOYEE SAFETY RESPONSIBILITY

Each employee is responsible for personal safety as well as the safety of others in the area. The employee will use all equipment provided in a safe and responsible manner as directed by the SS. All OHM personnel will follow the policies set forth in OHM's Employee Safety Guide and the OHM Health and Safety Procedures.

2.6 OSHA RECORDS

Required records including the OSHA 200 log are maintained at the OHM Divisional offices.

2.7 KEY SAFETY PERSONNEL

The following individuals share responsibility for health and safety at the site.

Site Supervisor

Mark Friar
609-421-7552 (pager)

Robert Hart
609-421-7571 (pager)

Todd King
609-412-7546 (pager)

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Site Safety Officer

Darryl C. Mike, OHST
609-869-8973 (pager)

Project Manager

David Leadenham
609-443-2800 (office)
609-421-7540 (pager)

**NER Health and Safety
Manager**

Kevin McMahon, M.S., CIH
609-443-2800 (office)
609-421-7523 (pager)

**Vice President, Health
and Safety**

Fred Halvorsen, Ph.D., PE, CIH
800-231-7031

3.0 JOB HAZARD ANALYSIS

This section outlines the potential chemical and physical hazards which workers may be exposed to during work on this project.

3.1 CHEMICAL HAZARDS

3.1.1 Fuel Oil #2 & #6

Exposure Routes:

- Skin
- Eye
- Inhalation
- Ingestion

TLV/PEL:

- 5mg/M3 Mineral oil mist

Effects of Over Exposure:

- Headaches, dizziness, nausea, vomiting
- Acne-like rash on arms and legs
- Benzene content of fuel oils effects carcinogenic risk

Other Hazards:

- In compatible with Acids and Oxidizers
- Will burn readily in a fire and may emit toxic by-products of carbon and nitrogen

3.1.2 Dioxin

Source of Exposure

- Transformer Waste Oil
- Contaminated Dust/Soil

Exposure Routes

- Skin
- Inhalation
- Ingestion

Current Exposure Standards

- TLV/PEL - No published exposure limits
- STEL - No published exposure limits
- Ceiling - No published exposure limits
- Action Level - No published exposure limits
- IDLH - No published exposure limits

Effects of Overexposure:

- Headache, dizziness, intoxication, narcosis
- Suspected human carcinogen
- Effects Central nervous system, skin, kidneys and liver

Work Practices

- Air Monitoring

- Wear proper personal protective Equipment

Engineering Controls

- 3.1.3 • Dust controls (water spray)
Lead

Source of Exposure

- Contaminated debris/soil
- Contaminated water

Route of Exposure

- Skin
- Inhalation
- Ingestion

Current Exposure Standards

- TLV/PEL - 0.05 mg/m³
- STEL - No published exposure limits
- Ceiling - No published exposure limits
- Action Level - 0.03 mg/m³
- IDLH - No published exposure limits

Exposure Symptoms

- Anemia, insomnia, anorexia and abdominal pain
- Gastrointestinal disorders, nerve damage and "wrist drop"

Exposure Target Organs

- Gastrointestinal tract
- Central Nervous System
- Kidneys
- Blood
- Gingival tissue

Air Monitoring Action Levels

- 0.025 mg/m³

Engineering Controls

- Dust control (water spray)

Work Practices

- Air Monitoring
- Proper personal protective equipment

Other Hazards

- Toxic fumes
- Reacts with oxidizers

3.1.4 Asbestos(Chrysotile)

Source of Exposure

- Friable insulation
- Contaminated debris

Route of Exposure

- Inhalation

Current Exposure Standards

- TLV - 0.5 fb/cc (>5 um in length)
- Ceiling - 10 fb/cc
- STEL - No published exposure limits
- IDLH - No published exposure limits

Exposure Symptoms

- Carcinogen
- Respiratory irritation

Exposure Target Organs

- Lungs
- Abdominal cavity
- Larynx

Air Monitoring Action Levels

- 2 fb/cc (>5 um in length)

Engineering Controls

- Water Spray
- Exhaust ventilation and capture filtration

Work Practices

- Air Monitoring
- Proper personal protective equipment

Personnel will be removed from the work site and placed under observation immediately if the following initial symptoms persist:

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Euphoria
- Chest pains and coughing
- Rashes or burns

3.2 PHYSICAL HAZARDS

To minimize physical hazards, OHM has developed standard safety protocols which will be followed at all times. Failure to follow safety protocols will result in expulsion of a crew member from the site.

All OHM personnel are familiar with the field activities which will be conducted at the site. They are trained to work safely under various field conditions. The SS and SSO will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize physical hazards. Also, hard hats, safety glasses, and steel-toe safety boots are required in all areas of the site.

3.3 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants always pose a hazard when performing outdoor tasks. The SSO and SS will make every effort to alleviate these hazards should they arise.

3.3.1 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. In particular:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

Heat stress is covered in detail during our 40 hour OSHA 20 CFR 1910.120 approved pre-employment course. In addition, this information is discussed during safety meetings before each workday. Workers are encouraged to increase consumption of water and electrolyte-containing beverages such as Gatorade.

At a minimum, workers will break every 2 hours for 10 to 15 minute rest periods. In addition, workers are encouraged to take rests whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased upon worker recommendation to the SSO and SS.

A work/rest schedule can be calculated based on heat stress monitoring results. Monitoring consists of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. The frequency of monitoring is provided herein.

AMBIENT TEMPERATURE	LEVEL D PPE	LEVEL C PPE/ MODIFIED LEVEL D
90° F or above	After 45 minutes of work	After 15 minutes of work
87.5 F-90 F	After 60 minutes of work	After 30 minutes of work
82.5-87.5 F	After 90 minutes of work	After 60 minutes of work
77.5-82.5 F	After 120 minutes of work	After 90 minutes of work

72.5-77.5 F	After 150 minutes of work	After 120 minutes of work
-------------	---------------------------	---------------------------

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by 1/3 and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, increase the following rest period by 1/3. The initial rest period should be at least 5 minutes.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70 degrees Fahrenheit, when wearing Level C PPE, or 80 degrees Fahrenheit for site activities performed in Level D.

3.3.2 Exposure to Cold

With outdoor work in the winter months, the potential exists for hypothermia and frostbite.

Protective clothing greatly reduces the possibility of hypothermia in workers. However, personnel will be instructed to wear warm clothing and to stop work to obtain more clothing if they become too cold. Employees will also be advised to change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation.

In cold weather, the potential for frostbite exists, especially in body extremities. Personnel will be instructed to pay particular attention to hands, feet, and any exposed skin when dressing. Personnel will be advised to obtain more clothing if they begin to experience loss of sensation due to cold exposure.

Employees will be encouraged to use the heated shelters on site at regular intervals depending upon the severity of ambient temperatures. Symptoms of cold stress, including heavy shivering, excessive fatigue, drowsiness, irritability, or euphoria necessitate immediate return to the shelter.

3.4 TASK-SPECIFIC RISK ASSESSMENT

3.4.1 Transformer Cleaning and Containment

The primary hazard associated with Transformer cleaning and containment include the following:

- Electrocution from cutting conduits
- Potential atmospheric and contact hazards
- Contact injury from materials being removed
- Slip, trip and fall hazards
- Injury from breaking lines
- Strains from moving materials and equipment

To prevent Injury, the following procedures must be followed:

- Personal protective equipment use shall be required
- Ambient air monitoring and visual monitoring shall be used to verify selection of PPE.
- Caution shall be exercised due to potential for cuts and puncture wounds from sharp and splintered debris.
- Welder's aprons and gloves can provide additional mechanical protection.
- Personnel shall avoid walking in oily areas to avoid slips, trips, and falls.
- Personnel shall be alert of slip, trip and fall hazards and correct hazards as necessary.
- Electrical current checked, Proper lockout/tagout procedures must be followed.
- OHM line breaking/entry procedures must be followed.
- Proper lifting techniques must be used.

3.4.2 SOIL EXCAVATION

Primary hazards associated with these activities are related to trench work with cave-ins being the most notable hazard. Factors contributing to cave-ins include:

- Lack of shoring
- Improper shoring
- Incorrect soil placement
- Broken utility lines
- Lack of proper warnings
- Water buildup

To prevent the possibility of cave-ins, the following procedures must be followed:

- Daily inspection of excavations will be made. If evidence of possible cave-ins or slides is apparent, work in the excavation will cease until the necessary precautions have been taken. Inspections must be made after every rainfall or other hazard-increasing occurrence. Increased protection will be invoked as necessary. Records of inspections will be maintained.
- If required the sides of trenches in unstable or soft material (e.g., sandy soil), 5 feet or more in depth, will be shored, sheeted, braced, sloped, or otherwise supported by means of sufficient strength to protect the employees working within them. Recommended angle of repose of this site would be 40 degrees.
- In excavations which employees may enter, excavated or other material will be effectively stored and retained at least 2 feet or more from the edge of the excavation.
- Diversion ditches, dikes, or other suitable means will be used to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation. Water will not be allowed to accumulate in an excavation.
- When employees are required to be in trenches 4 feet deep or more, an adequate means of exit such as a ladder or steps will be provided and located to require no more than 25 feet of lateral travel.

Other hazards which may be encountered during trenching operations at this site include:

- Personnel slipping, tripping, and falling from excavated material or other construction debris and open trenches.
- Striking or being struck by heavy equipment, vehicular traffic, or other objects.
- Excessive noise levels from operation of heavy equipment or other power-operated tools.

Specific requirements for this job site include the following:

- Walkways, runways, and sidewalks will be kept clear of excavated material or other obstructions.
- Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails will be provided.
- Employees exposed to vehicular traffic will be provided with and will be instructed to wear warning vests marked with or made of reflectorized or high-visibility material.
- No person will be allowed under loads handled by power shovels.
- Employees engaged in trench work will wear, as a minimum, hard hats, steel-toe safety boots, and safety glasses with side shields.
- Construction areas will be posted with legible traffic signs at points of hazards. When operations are such that signs, signals, and barricades do not provide the necessary protection on or adjacent to a highway or street, flagmen or other appropriate traffic controls will be provided.

3.4.3 Container Consolidation and Staging

This stage of the operation will consist of restaging drums, sampling of unknowns, gathering and identifying laboratory containers, overpacking of containers, and compatibility testing for bulking.

Before moving drums or containers, employees exposed to the transfer operation will be warned of the potential hazards associated with the contents of the drums or containers. MSDSs, if available, will be consulted.

The United States Department of Transportation (USDOT) specified salvage drums or containers and suitable quantities of proper absorbent will be available

and used in areas where spills, leaks, or ruptures may occur.

Where major spills may occur, a spill containment program will be implemented to contain and isolate the entire volume of the hazardous substance being transferred.

Drums and containers that cannot be moved without rupture, leakage, or spillage will be emptied into a sound container using a device classified for the material being transferred. Soil or covering material will be removed with caution to prevent drum or container rupture.

Fire extinguishing equipment will be on hand and ready to control small fires.

Chemical spills, splashes, and reactions between incompatible chemicals present the greatest risk for exposure in these operations. The principal routes of exposure are skin contact and inhalation.

The following standard operating procedures will be followed when handling drums and containers to minimize hazards:

- Drums and containers used during the cleanup shall meet the appropriate DOT, OSHA, and USEPA regulations for their respective wastes.
- Drums and containers will be inspected and their integrity ensured prior to being moved. Drums or containers that cannot be inspected before being moved because of inaccessible storage conditions will be moved to an open location and inspected before further handling.
- Unlabeled drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.
- Sampling of unidentified compounds may be performed.

Chemical spills, splashes, and reactions between incompatible chemicals present the major risks for exposure in these operations. The principal routes of exposure are skin contact and inhalation. Level B protection will be used during sampling. The following procedures will be followed in areas where drums or containers are being opened:

- Where an airline respirator system is used, connections to the bank of air

cylinders will be protected from contamination and the entire system protected from physical damage.

- Employees not involved in opening drums or containers will be kept a safe distance from the drums or containers being opened.
- If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation will be placed between the employees and the drums or containers being opened to protect the employee in case of accidental explosion.
- Personnel performing or supporting drum opening will remain behind an explosion/splash-resistant barrier during the opening. Fire suppression equipment will be staged at the work area if warranted by exhibited bulging or reactivity with additional backup equipment at the command post (CP).
- Material-handling equipment and hand tools will be of the type that prevent sources of ignition.
- Drums which show deterioration may require the use of a remote drum opener equipped with a non-sparking punch. The operation will be performed in Level B protection. Support personnel will be at a safe distance or behind a barrier such as a building.

Continuous air monitoring should be performed with PID and monotox units. Adequate lighting must be made available to prevent slips, trips, and falls, being struck by or against objects, and to facilitate job performance.

After categorizing the drums of material, they will be opened and the contents placed into bulking chambers. If warranted drum bulking and overpacking

operations will be performed in Level B protection.

The drum staging area should be kept free of debris. Inspection of bulking chambers should be made for many residual materials inside the chamber. Properly rated pumps shall be used for hazardous liquids. Drum puncturing must be done only with non-sparking tools and remotely from behind a blast shield.

3.4.4 Container Sampling

Sampling of unidentified wastes may be included in the scope of work during this phase of remediation activities.

Chemical spills, splashes, and reactions between incompatible chemicals present the major risks for exposure in these operations. The principal routes of exposure are skin contact and inhalation. Level B protection will be used during sampling. The following procedures will be followed in areas where drums or containers are being opened:

- Where an air line respirator system is used, connections to the bank of air cylinders will be protected from contamination and the entire system protected from physical damage.
- Employees not involved in opening drums or containers will be kept a safe distance from the drums or containers being opened.
- If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation will be placed between the employee and the drums or containers being opened to protect the employee in case of accidental explosion.
- Personnel performing or supporting drum opening will remain behind an explosion/splash-resistant barrier during the opening. The barrier with fire suppression equipment will be behind additional equipment at the command post (CP).
- Material-handling equipment and hand tools will be of the type that prevent sources of ignition.
- Some drums may show deterioration. These drums may require the use of a remote drum opener equipped with a non-sparking punch. The operation will be performed in Level B protection. Support personnel will be at a safe

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distance or behind a barrier such as a building.

4.0 WORK AND SUPPORT AREAS

To prevent migration of contamination caused through tracking by personnel or equipment, work areas and personal protective equipment will be clearly specified prior to beginning operations. OHM has designated work areas or zones as suggested by the NIOSH/OSHA/USCG/EPA'S document titled, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities." Each work area will be divided into three zones as follows:

- An Exclusion or "hot" Zone (EZ)
- A Contamination-Reduction Zone (CRZ)
- A Support Zone (SZ)

4.1 EXCLUSION ZONE

The EZ is the area suspected of contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the mandated level of protection for that area. In certain instances, different levels of protection will be required depending on the tasks and monitoring performed within that zone.

4.2 CONTAMINATION-REDUCTION ZONE

The CRZ or transition zone will be established between the EZ and SZ. In this area, personnel will begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the EZ through the CRZ.

4.3 SUPPORT ZONE

The SZ serves as a clean, control area. Operational support facilities are located within the SZ. Normal work clothing and support equipment are appropriate in this zone. Contaminated equipment, or clothing will not be allowed in the SZ. The support facilities should be located upwind of site activities. There will be a clearly marked controlled access point from the SZ into the CRZ and EZ that is monitored closely by the SSO and the SS to ensure proper safety protocols are followed.

4.4 GENERAL

The following items are requirements to protect the health and safety of workers and will be discussed in the safety briefing prior to initiating work on the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of contamination is prohibited in the EZ and CRZs.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and smoking or other activities which may result in ingestion of contamination.
- A buddy system will be used. Hand signals will be established to maintain communication.
- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance. All personnel will be aware of dangerous situations that may develop.
- Visual contact will be maintained between buddies on site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SSO or the SS, will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All employees and visitors must sign in and out of the site.

5.0 PROTECTIVE EQUIPMENT

This section addresses the various levels of personal protective equipment (PPE) which are or may be required at this job site. OHM personnel are trained in the use of all PPE utilized.

5.1 ANTICIPATED PROTECTION LEVELS

<i>TASK</i>	<i>PROTECTION LEVEL</i>	<i>COMMENTS/MODIFICATIONS</i>
Soil Excavation	Level D	Upgrade to level C if air monitoring levels exceed unknown action levels (see Section 7 of HASP)
Container Consolidation, Restaging and Sampling	Level C Level B	Monitor for flammable, toxic, oxygen deficient atmosphere (see Section of HASP)
Asbestos Removal	Level C	Air Monitoring required during work in progress and post sampling of completed area(see procedure policy - asbestos abatement)
Transformer Cleaning and Restaging	Level C	Upgrade to level B if air monitoring levels exceed unknown action levels (see Section 7 of HASP)
CRZ Workers	Level D	
Support Zone Workers	Level D	

5.2 PROTECTION LEVEL DESCRIPTIONS

This sections lists the minimum requirements for each protection level. Modification

to these requirements will be noted above.

5.2.1 Level D

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather

5.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, or PVC overboots or vinyl booties
- Outer nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)
- Tyvek coverall [Saranex Tyveks (Sarans) and PVC acid gear will be required when workers have a potential to be exposed to contaminated liquids or sludges.]

5.2.3 Level C

Level C consists of the following:

- Full-face, air-purifying respirator with GMC-H cartridges

- Hooded Tyvek coveralls and Saranex Tyveks (Sarans) (PVC acid gear will be required when workers have a potential to be exposed to contaminated liquids or sludges.)
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, or PVC overboots
- Nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)

5.2.4 Level B

Level B protection consists of the items required for Level C protection with the exception that an air-supplied respirator is used in place of the air-purifying respirator.

5.2.5 Level A

Level A protection consists of the items required for Level B protection with the addition of a fully-encapsulating, vapor-proof suit capable of maintaining positive pressure.

5.3 SUPPLIED-AIR RESPIRATORS

If air monitoring shows that Level B protection is needed, OHM personnel will wear Survivair 9881-02 Hippack Airline respirators with 5-minute egress bottles. Personnel requiring Level "B" protection and high mobility will wear Survivair Mark 2 SCBA units.

5.4 BREATHING-AIR QUALITY

Code of Federal Regulations 29 CFR 1910.134 states breathing air will meet the requirement of the specification for Grade D breathing air as described in the compressed Gas Association Specification G 7.1-1989. OHM requires a certificate

of analysis from vendors of breathing air in order to show that the air meets this standard.

5.5 AIR-PURIFYING RESPIRATORS

OHM's air-purifying respirators are the MSA Ultra-Twin or the American Optical "Omnistar", Commander", or "Seven Star", full-face respirators.

5.6 RESPIRATOR CARTRIDGES

The crew members working in Level C will wear respirators equipped with MSA GMC-H air-purifying cartridges, unless otherwise noted. The GMC-H cartridge holds approval for:

- Organic vapors <1,000 ppm
- Chlorine gas <10 ppm
- Hydrogen chloride <50 ppm
- Sulfur dioxide <50 ppm
- Dusts, fumes and mists with a TWA <0.05 mg/m³
- Asbestos-containing dusts and mists
- Radon daughters
- Radionuclides
- Pesticides

5.7 CARTRIDGE CHANGES

All cartridges will be changed a minimum of once daily. However, water saturation of the HEPA filter or dusty conditions may necessitate more frequent changes. Changes will occur when personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property.

5.8 INSPECTION AND CLEANING

Respirators are checked periodically by a qualified individual and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after use.

5.9 FIT TESTING

Annual respirator fit tests are required of all personnel wearing negative-pressure respirators. The test will use isoamyl acetate or irritant smoke. The fit test must be for the style and size of the respirator to be used.

5.10 FACIAL HAIR

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

5.11 CORRECTIVE LENSES

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided.

5.12 CONTACT LENSES

Contact lenses will not be worn with any type of respirator.

5.13 MEDICAL CERTIFICATION

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees receive a written physicians opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).

5.14 SITE-SPECIFIC RESPIRATORY PROTECTION PROGRAM

The OHM Respiratory Protection Program complies with 29 CFR 1910.134. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining respirator need are contained in Section 7.0 of this HASP. The GMC-H cartridges will protect employees from the hazardous substances specific to this site. All respirator users are OSHA trained in proper respirator use and maintenance. The SS and SSO will observe workers during respirator use for signs of stress and will monitor air levels of contaminants to ensure that respiratory protection is sufficient. The SS, CIH, and SSO will also evaluate this HASP weekly to determine its continued effectiveness.

All respirators and cartridges used will provide adequate protection against the hazards for which they were designed in accordance with applicable standards. All persons assigned to use respirators will have medical clearance to do so.

6.0 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

6.1 PERSONNEL DECONTAMINATION

Decontamination procedures will ensure that material which workers may have contacted in the EZ does not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedure. The specific stages will vary depending on the site, the task, the protection level, etc.

1. Go to end of EZ
2. Wash outer boots and gloves in detergent solution
3. Rinse outer boots and gloves in water
4. Remove outer boots and let dry
5. Remove outer gloves and let dry
6. Cross into CRZ
7. Wash splash suit
8. Rinse splash suit
9. Remove splash suit and let dry
10. Remove booties and discard
11. Remove sample gloves and discard
12. Remove Saranex Tyvek suit and discard
13. Remove sample gloves and discard
14. Remove and wash respirator
15. Rinse respirator and hang to dry
16. Remove sample gloves and discard
17. Remove Tyvek and discard
18. Remove booties and discard
19. Remove sample gloves and discard

6.1.1 Suspected Contamination

Any employee suspected of sustaining skin contact with type or debris will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station.

6.1.2 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

6.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be decontaminated before leaving the site. Decontamination procedures will vary depending upon the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the SSO.

6.3 DISPOSAL

All liquids and disposable clothing will be treated as contaminated waste and disposed of properly.

7.0 AIR MONITORING

Air monitoring will be conducted in order to determine airborne contamination levels. This ensures that respiratory protection is adequate to protect personnel against the chemicals that are encountered. The following air monitoring efforts will be used at this site. Additional air monitoring may be conducted at the discretion of the SSO.

The following chart describes the air monitoring required and appropriate action levels.

<i>Monitoring Device</i>	<i>Action Level</i>	<i>Action</i>
LEL/O ₂	> 10% LEL < 20.8% O ₂	Evacuate area, ventilate, upgrade to Level B if necessary, continue to monitor
PID	1-5 ppm unknowns 5-100 ppm unknowns > 100 ppm unknowns	Level C Level B Level A

7.1 LOWER EXPLOSIVE LIMIT/OXYGEN (LEL/O₂) METER

Prior to entering a confined-space area or hot work involving welding, cutting, or other high heat-producing operations where flammable or combustible vapors may be present, LEL/O₂ measurements will be taken.

7.2 PHOTOIONIZATION DETECTOR (PID)

A PID will be used to monitor total ionizable organic content of the ambient air. A PID will prove useful as a direct reading instrument to aid in determining if respiratory protection needs to be upgraded and to define the EZ.

For known contaminants only, to determine a protection level from PID data, the

SSO will multiply the TLV of the known compound by 25. This is the limit for Level C protection for that compound. If PID readings exceed 25 times the TLV, Level B protection will be required. Also, regardless of the TLV, a PID reading of 1,000 ppm or more will indicate that the GMC-H cartridges may become overloaded and will necessitate Level B protection. (Note: PID readings do not always indicate the actual air concentration of a compound. Consult the manual, HNU, or the CIH for clarification.)

The SSO will take measurements before operations begin in an area to determine the amount of organic compounds naturally occurring in the air. This is referred to as a background level.

Levels of volatile organic compounds will be measured in the air at active work sites once every hour and at the support zone once every hour when levels are detected above background in the exclusion zone. If levels exceed background at any time in the support zone, work in the exclusion zone will cease and corrective actions will be taken, e.g., cover soil with polyethylene sheeting, applying vapor-suppressing foam to soil. Work will not resume until levels are below background in the support zone.

7.3 AIR MONITORING LOG

The SSO will ensure that all air-monitoring data is logged into a monitoring notebook. Data will include instrument used, wind direction, work process, etc. The Regional and Corporate OHM CIH will periodically review this data.

7.4 CALIBRATION REQUIREMENTS

The PID, LEL/O₂ meter and sampling pumps required with fixed-media air sampling will be calibrated daily prior to use. A separate log will be kept detailing date, time, span gas, or other standard, and name of person performing the calibration.

7.5 AIR MONITORING RESULTS

Air monitoring results will be posted for personnel inspection, and will be discussed during morning safety meetings.

8.0 EMERGENCY RESPONSE

Prior to field activities, the SS will plan emergency egress routes and discuss them with all field personnel.

8.1 EMERGENCY SERVICES

A tested system will exist for rapid and clear distress communication. All personnel will be provided concise and clear directions and accessible transportation to local emergency services. A map outlining directions to the nearest hospital will be posted on site.

The following emergency equipment will be present on the site:

- Fire extinguishers
- Industrial first-aid kit
- Eye wash bottles
- Emergency shower

8.2 COMMUNICATION

Each member of the site entry team will be able to communicate with another entry team member at all times. Communications may be by way of the following methods:

- Sound (air horn)
- Electronic (radio, bull horn)
- Visual (hand signals)

The following standard hand signals will be mandatory for all employees regardless of other means of communication:

- Hand gripping throat--Out of air, cannot breath

- Hands on top of head--Need assistance
- Thumbs up--OK, I'm alright, I understand
- Thumbs down--No, negative
- Gripping partner's wrist, or gripping both hands on wrist--Leave area immediately

8.3 EMERGENCY EVACUATION FROM EXCLUSION AND CONTAMINATION-REDUCTION ZONES

Any personnel requiring emergency medical attention will be evacuated immediately from EZ and CRZ. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The SS and SSO decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the injury and the nature of the contaminant.

If decontamination cannot be performed because it may aggravate the injury or delay life-saving treatment, the emergency response personnel will:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel and emergency vehicles.
- Alert emergency and medical personnel to potential contamination; instruct them about specific decontamination procedures.
- Send site personnel familiar with the incident to the hospital with the victim.

8.4 FIRST AID

Qualified personnel only will give first aid and stabilize an individual needing assistance. Professional medical assistance will be obtained at the earliest possible opportunity.

To provide first-line assistance to field personnel in the case of illness or injury, the following items will be made immediately available:

- First-aid kit

- Portable emergency eye wash
- Supply of clean water

8.5 EMERGENCY ACTIONS

If actual or suspected serious injury occurs, these actions will be taken:

- Remove the exposed or injured person(s) from immediate danger.
- Render first aid if necessary. Decontaminate affected personnel after critical first aid is given.
- Obtain paramedic services or ambulance transport to local hospital. This procedure will be followed even if there is no visible injury.
- Other personnel in the work area will be evacuated to a safe distance until the site supervisor determines that it is safe for work to resume. If there is any doubt regarding the condition of the area, work will not commence until all hazard-control issues are resolved.
- Notify client of incident.

8.6 GENERAL EVACUATION PLAN

In the general case of a large fire, explosion, or toxic vapor release, a site evacuation will be ordered and will follow these steps:

- Sound the applicable alarm and advise client representative.
- Evaluate the immediate situation and downwind direction. All personnel will evacuate in the upwind direction.
- All personnel will assemble in an upwind area. When the situation permits, a head count will be taken.
- Determine the extent of the problem. Dispatch a response team in protective clothing and self-contained breathing apparatus on site to evacuate any missing personnel or to correct the problem.

8.7 EMERGENCY TELEPHONE NUMBERS

The following telephone numbers will be posted at the site before work begins:

Fire Department: (908) 826-1111

Police Department: (908) 442-4400

New Jersey Poison Control Center: 1-800-962-1253

Hospital: Raritan Bay Medical Center, 530 New Brunswick Ave.
Perth Amboy, N.J.

Hospital Phone Number: (908) 442-3700

Directions to the hospital: Exit the Site and make right turn on to State Street. Proceed straight ahead on State Street until New Brunswick Ave. Make left on to New Brunswick Ave. proceed two blocks and Medical Center will be on your right on the corner.

The approximate distance from Site to Hospital is 3 Miles, the exact driving will be measured upon arrival on Site.

APPENDIX A

HEALTH AND SAFETY PLAN CERTIFICATION



I HAVE READ THE SITE SAFETY PLAN FOR THIS SITE AND FULLY UNDERSTAND ITS CONTENTS.

DATE

[REDACTED]

APPENDIX B

OHM HAZARD COMMUNICATION PROGRAM



OHM Corporation

HEALTH & SAFETY PROCEDURES

HAZARD COMMUNICATION

PROCEDURE NUMBER 15

Page 1 of 13

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

A Hazard Communication (Employee Right-To-Know) Program will be instituted at all OHM Remediation Services Corp. (OHM) facilities and job-sites. A copy of the written Hazard Communication Program contained in this procedure will be present at all OHM job-sites, shops, and facilities.

2. PURPOSE

The purpose of Hazard Communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at field project sites, shops, and facilities are transmitted (communicated), according to 29 CFR 1910.1200 and 29 CFR 1926.59 to all OHM personnel and OHM subcontractors.

3. GENERAL REQUIREMENTS

- 3.1 It is the responsibility of site supervisors, shop supervisors, and facilities managers to ensure that the Hazard Communication Program for the area under their supervision is updated as necessary.
- 3.2 Container Labeling--OHM personnel will ensure that all drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced by on site operations. All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party.
- 3.3 Material Safety Data Sheets (MSDSs)--There will be an MSDS located on site for each hazardous chemical known to exist or which is being used on site. All MSDSs will be located in the site health and safety plan which can be found in the office trailer. MSDS's for products in use may be stored in a separate binder.
- 3.4 Employee Information and Training--Training employees on chemical hazards is accomplished through an ongoing corporate and regional training program. Additionally, chemical hazards will be communicated to employees through daily safety meetings held at OHM field projects and by an initial site orientation program.

3.5 OHM employees will be instructed on the following:

- **Chemicals and their hazards in the work area**
- **How to prevent exposure to these hazardous chemicals**
- **What the company has done to prevent workers' exposure to these chemicals**
- **Procedures to follow if they are exposed to these chemicals**
- **How to read and interpret labels and MSDSs for hazardous substances**
- **Emergency spill procedures**
- **Proper storage and labeling**

3.6 Before any new hazardous chemical is introduced on site, each employee will be given information in the same manner as during the initial safety class. The site supervisor will be responsible for seeing that the MSDS on the new chemical is available. During the mandatory morning safety briefing, information on each new chemical will be presented.

Should any new chemical be brought on site, the appropriate MSDSs will be added and reviewed with the employees.

HAZARD COMMUNICATION PROGRAM

Project Site Version

1. GENERAL

The following written Hazard Communication Program has been established for OHM Remediation Services Corp. (OHM). The purpose of this program is to transmit information to the workers about the chemical hazards in the work place using various media. The transmittal of information will be accomplished by means of a comprehensive Hazard Communication Program, which will include container labeling and other forms of warning, material safety data sheets (MSDSs), and employee training in accordance with 29 CFR 1910.1200 and 29 CFR 1926.59.

Upon mobilization at the job site the Hazard Communication Program will be reviewed with all employees. Upon reading the Hazard Communication Program employees will be asked to sign the "Worker Hazard Communication Acknowledgment Form". The Hazard Communication Program will also be reviewed with new employees and visitors as they arrive on site. These persons will also be asked to sign the acknowledgment form. The Hazard Communication Program shall be available for review by anyone on site any time during normal work hours. OHM will accomplish the hazard communication requirements through formal safety training, departmental safety meetings, and job-site safety meetings.

The Health and Safety Department shall update the Hazard Communication Program when personnel responsibilities change, a new non-routine task is introduced, or an extremely hazardous material needs particular attention. This new program will then be distributed throughout the company.

2. RESPONSIBILITIES

Overall responsibility for compliance with the Hazard Communication Program rests with officers, managers, and supervisors of OHM. A brief outline of responsibilities for those persons directly involved with the program will follow. These responsibilities are not all inclusive, but are designed to give guidance in initial and long-term program development. Since each area is different, these responsibilities may vary.

This program is intended to cover those employees who are directly involved with the handling of hazardous chemicals or supervision of activities that involve the use of hazardous chemicals.

2.1 Health and Safety Department Responsibilities

- Review operations with site supervisors to determine what tasks require hazard communication training.
- Advise supervisory people as to which materials may need to be considered hazardous initially and eventually to ensure that hazard task determination is being done according to the written policy.
- Follow up through safety meetings and safety audits to ensure that supervisors are carrying out prescribed company policy.
- Notify supervisors immediately of any operating changes affecting the hazardous chemicals being used.
- Periodically audit the Hazard Communication Program's progress using the Hazard Communication Program audit sheet found at the end of this procedure.

2.2 Training Department Responsibilities

- Ensure that up-to-date records are maintained on training of all employees required to handle hazardous chemicals. The supervisor should keep copies of these records and should also send copies of the initial training to the corporate training secretary for the training file.
- Educate personnel upon initial 40-hour OSHA training to the requirements of the Hazard Communication Standard.

2.3 Site Supervisors' Responsibilities

- Identify jobs requiring the use of hazardous chemicals and provide a list of those jobs and chemicals to the health and safety department.
- Provide the training required by the Hazard Communication Standard and document training of employees in the safe handling of hazardous chemicals.
- Ensure inspection of engineering controls and personal protective equipment before each use. The health and safety department shall help determine a suitable inspection plan for each application as needed.
- Make daily surveys of the work area to ensure that safe practices are being followed. Advise employees of and document unsafe work practices on the first occasion and consider further unsafe work practices as disciplinary violations. Use documentation as topics of safety meetings.

- Ensure required labeling practices are being followed. Labels should be affixed to the container when it arrives. If the contents are transferred to another container, then all label information (manufacturer, manufacturer's telephone number, product name, target organ(s) and product number) must also be affixed to the new container, so that all containers of the material, regardless of size, are labeled. Contact the health and safety department for proper labels.
- Enforce all applicable safety and health standards through periodic documented audits.
- Before ordering a material, determine if a MSDS exists on file. Request a MSDS from the manufacturer for all new products.
- Contact the health and safety department upon receiving new MSDSs to ensure that they have a copy. If they do not, then the site supervisor shall forward a copy to them.

2.4 Employee Responsibilities

- Read and understand entire Hazard Communication Program.
- Obey established safety rules and regulations.
- Use all safety procedures and personal protective equipment as required by company procedures.
- Notify supervisor of the following:
 - Any symptoms or unusual effects that may be related to the use of hazardous chemicals.
 - Any missing, incomplete, or unreadable labels on containers.
 - Missing, damaged, or malfunctioning safety equipment.
- Use approved labels on containers; do not remove labels (labels are available from the health and safety department).
- Use only approved containers for hazardous chemicals. (Is chemical and container compatible and appropriate?)
- Know where emergency equipment and first-aid supplies are located.

- Know location of MSDSs. These will be located in the break/decon area and the job-site office trailer.
- Know what you are expected to do in case of an emergency. Before the commencement of any task, emergency considerations shall be made.

2.5 Shipping/Receiving Personnel Responsibilities

- The Project Control Technician (PCT) or other persons assigned by the site supervisor shall ensure MSDSs are received with initial shipment of a hazardous chemical; if not, contact purchasing to request the appropriate MSDS and also call the health and safety department to determine if there is a MSDS available until the requested MSDS arrives.
- Ensure labels with required information are affixed to all containers.
- Store hazardous materials in designated locations.
- Use proper personal protective equipment when handling hazardous chemicals.
- Report damaged containers or spills to the site supervisor and the site safety officer immediately.

3. HAZARD DETERMINATION

OHM will rely on MSDSs from chemical suppliers and manufacturers to meet hazard determination requirements. Other relevant data from laboratory analyses, chemical reference materials, and chemical manufacturers' written evaluation procedures will be utilized when warranted. No other method shall be used to determine a chemicals' hazards unless approved by the health and safety department.

4. LABELING

The site supervisor will be responsible for seeing that all containers arriving at OHM job sites are properly and clearly labeled. Site supervisors shall also check all labels for chemical identity and appropriate hazard warnings. If the hazardous chemical is regulated by OSHA in a substance specific health standard (29 CFR 1910), the site supervisor shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard. Any container that is not labeled shall be immediately labeled after initial discovery with the required information.

The site supervisor, general foreman, or foreman shall be responsible for seeing that all portable containers used in their work area are properly labeled with chemical identity and hazard warning. (Refer to MSDS for required labeling information.)

The site supervisor, general foreman, or foreman shall also ensure that labels on hazardous chemical containers are not removed or defaced unless the container is immediately marked with the required information and that all labels are legible in English and prominently displayed on the container or readily available in the work area throughout each shift.

If any container is found and the contents cannot be identified, the site supervisor shall be contacted immediately. When proper identification is made, a label shall be affixed to the container immediately. If it is discovered that no MSDS is available, the manufacturer and the health and safety department shall be contacted to assist in locating the proper MSDS. If there is no means of identifying the material in the container, the container shall be taken out of service, away from all personnel until it can be tested by the health and safety department or laboratory personnel. The site supervisor shall communicate their findings or awareness of such containers to all personnel working in the area and to the regional health and safety manager.

5. MATERIAL SAFETY DATA SHEETS (MSDS)

The site supervisor at OHM job sites will be responsible for maintaining a current MSDS relevant to the hazardous chemicals used on their job sites. The health and safety department will be responsible for compiling the initial MSDS file for the job site and aiding all job sites with the completion and maintenance of their respective MSDS files.

All MSDSs shall be readily available for review by all employees during each work shift. Each job site will designate a clearly marked "Employee Right-to-Know" station where employees can immediately obtain a MSDS and the required information in an emergency. MSDSs shall also be made available, upon request, to designated OHM representatives, other employer's employees, and to any OSHA inspector in accordance with the requirements of 29 CFR 1910.1200(e).

Although manufacturers are required to provide employers with MSDSs on an initial chemical shipment, OHM purchasing agents (and site supervisors purchasing their own material) shall request MSDSs and updates to MSDSs on all purchase orders. Site supervisors that are without proper MSDSs shall be responsible for requesting this information from chemical manufacturers. The site supervisor shall maintain a file of follow-up letters for all hazardous chemical shipments they receive without MSDSs.

6. EMPLOYEE INFORMATION AND TRAINING

It is the responsibility of the supervisor in charge of each employee to ensure that the employee is properly trained. Training employees on chemical hazards and chemical handling is accomplished at the time of initial employment at OHM, whenever a new chemical (or physical) hazard is introduced into the work area, and through ongoing formal and informal training programs. Additionally, chemical hazards are communicated to employees through weekly and morning, job-site safety meetings, which shall be documented according to topic, major points discussed, and names of those attending (attendance is mandatory). Records of all formal training conducted at OHM are coordinated and maintained by the Training Department secretary.

At a minimum, OHM will inform employees on the following:

- The requirements of 29 CFR 1910.1200--Hazard Communication--Evaluating the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees. OHM shall accomplish employee training in several different ways including, but not limited, to 40-hour OSHA Hazardous Waste Worker Training (29 CFR 1910.120), shop safety meetings, job-site safety meetings, Health and Safety Department safety meetings, and formal and informal training about specific chemical hazards.
- The location and availability of the written Hazard Communication Program, list of hazardous chemicals, and MSDSs will be periodically posted on the employee bulletin boards providing the location of the above material.
- Any operations in their work area where hazardous chemicals are present.
- How to work safely with chemicals present in the workplace and minimize potential exposure.

Employee training shall include the following:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (monitoring instruments, visual appearance or odor, and acute and chronic health effects).
- The physical, chemical, and health hazards of the chemicals in the work area.

- The methods of preventing exposure to hazardous chemicals including the measures OHM has taken to protect the employees.
- Procedures to follow if OHM employees are exposed to hazardous chemicals (location of the nearest phone, emergency eyewash, and shower will be included). These discussions shall include proper operating procedures for all emergency equipment.
- The details of the OHM written Hazard Communication Program, including an explanation of the labeling system and the MSDSs, and how employees can obtain and use the appropriate hazard information.
- Standard operating procedures within each respective shop. OHM company policy determines what is considered standard operating procedures.
- Procedures for workers involved in non-routine tasks.

Each site supervisor shall ensure that the above training is emphasized to OHM employees. The health and safety department will ensure that each job site is properly informing and training all employees through group meetings and individual discussions. Whenever a new hazardous chemical is placed into use, the site supervisor shall inform the employees of the hazards said chemical may pose. The site supervisor shall also be responsible for obtaining and making available a MSDS for the new chemical.

7. HAZARDOUS NON-ROUTINE TASKS

Occasionally, employees at OHM are required to perform tasks which are considered to be non-routine. All tasks OHM considers non-routine shall be carefully discussed among the supervisor and those performing the task. This safety briefing shall include all possible hazards an employee may encounter while completing the task, including:

- Hazard recognition
- Chemicals involved and their hazardous properties
- Physical hazards
- Methods of avoiding hazards (monitoring instruments, proper personal protective equipment, etc.)

The following is a list of some of the non-routine tasks which may occur at OHM job sites. These tasks are all covered in detail in various OHM standard operating Procedures.

- 7.1 Confined Space Entry
- 7.2 Excavation, Trenching, and Shoring
- 7.3 Decontamination of Equipment
- 7.4 Laboratory Spills
- 7.5 High-Pressure Washer (Laser) Operation
- 7.6 Line Entry Procedure
- 7.7 Hot Work

8. INFORMING CONTRACTORS

It shall be the responsibility of the OHM site supervisor to provide subcontractors with the following information:

- Hazardous chemicals to which they may be exposed while performing a task including the following:
 - Chemical properties
 - Physical properties
 - Acute/Chronic health effects
- Location of "Employee Right-to Know" station which includes the following:
 - MSDS for work area
 - Hazard Communication Program
 - Other relevant safety material such as Project Health and Safety Plan (HASP)
- Precautionary measures to be taken to protect employees from chemical and physical hazards.
- Location of nearest emergency equipment (fire extinguisher, eyewash, shower, phone, first-aid kit, etc.)
- Procedures to follow in the event of employee exposure.

[illegible]

20.

The following is a list of hazardous chemicals used on this OHM job site. Further information on each hazardous chemical listed below can be found in the MSDS which are included in the site specific health and safety plan.

• **Typical OHM Job-Site Hazardous Chemical Inventory List**

Chemicals

Acetone
 Acetylene
 Activated Charcoal, Powder
 Alum (Aluminum Sulfate)
 Anti-fog Bausch & Lomb
 Argon/Methan (95%/5%)
 Brake Fluid
 Calcium Hydroxide (Hydrated Lime)
 Calibration Check Gas
 Carbon
 Caustic Soda (Sodium Hydroxide)
 Citrikleen
 Coal Fly Ash
 Compressed Air
 Diatomaceous Earth
 Diesel Fuel
 Dry Ice (Solid Carbon Dioxide)
 Ethylene Glycol
 Ferric Chloride
 Freon
 Gear Grease - Delta
 Helium
 Hexane
 Hydraulic Fluid
 Hydrochloric Acid
 Hydrogen
 Isobutylene
 Kiln Dust
 Methanol
 Nitrogen
 Nitrous Oxide
 Oxygen
 Penetone
 Pentane
 Polymers (Flocculants)
 Premium Unleaded Gasoline

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APPENDIX C

MSDS LIST

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY, NY 12303-1836 USA
(518) 377-8855



No. 470

DIESEL FUEL OIL NO. 2-D

Date October 1981

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: DIESEL FUEL OIL NO. 2-D

DESCRIPTION: Mixture of petroleum hydrocarbons; a distillate oil of low sulfur content

OTHER DESIGNATIONS: ASTM D975, CAS # 068 476 346

MANUFACTURER: Available from many suppliers

SECTION II. INGREDIENTS AND HAZARDS

Diesel Fuel Oil No. 2-D
Complex mixture of paraffinic, olefinic, naphthenic
and aromatic hydrocarbons**
Sulfur content
Benzene***
*Current OSHA standard and ACGIH (1981) TLV
**Diesel fuels tend to be low in aromatics and high in
paraffinics. A min. Cetane No. of 40 is required
(ASTM D613).
***A low benzene level reduces carcinogenic risk.
Fuel oils can be exempted under the benzene standard
(29 CFR 1910.1028)

%	HAZARD DATA
>95	8-hr TWA 5mg/m ³ * (mineral oil mist)
<0.5	
<100 ppm	

SECTION III. PHYSICAL DATA

Boiling point range, deg F, ----- Ca 340-675 Specific gravity (H₂O=1) ---- <0.86
Solubility in water ----- negligible Cloud point (wax), deg C --- Ca 0
Viscosity at 40 C, cSt ----- 1.9-4.1

Appearance and Odor: Clear, bright liquid with a mild petroleum odor.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
125F min (PM)	>500F	% by volume	0.6	7.5

Extinguishing Media: Dry chemical, carbon dioxide, foam, water spray. Use a water spray to cool fire exposed containers. Use a smothering technique for extinguishing fire of this combustible liquid. Do not use a forced water stream directly on oil fire as this will only scatter the fire. Material is a OSHA Class II combustible liquid. Firefighters should wear self-contained breathing apparatus and full protective clothing.

SECTION V. REACTIVITY DATA

This is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.
Incompatible with strong oxidizing agents; heating greatly increases fire hazard.
Thermal -oxidative degradation may yield various hydrocarbons and hydrocarbon derivatives (partial oxidation products), CO₂ and CO and SO₂.



SECTION 1. MATERIAL IDENTIFICATION

19

MATERIAL NAME: LEAD MONOXIDE

OTHER DESIGNATIONS: Lead (II) Oxide, Plumbous Oxide, Litharge, Massicot, PbO, CAS # 1317-36-8

MANUFACTURER/SUPPLIERS: Available from several suppliers, including:

NL Baroid, Inc., PO Box 1675, Houston, TX 77251; Telephone: (713) 527-1100
Eagle-Picher Industries, Inc., Chemicals Division, 580 Walnut Street, Cincinnati, OH 45202;
Telephone: (513) 721-7010

HMIS

H: 2

F: 0

R: 0

PPE: *

* See Sect. 8

Not Found

R 0

I 4

S 0

K 0

SECTION 2. INGREDIENTS AND HAZARDS

%

HAZARD DATA

LEAD MONOXIDE, PbO

>99

ACGIH TLV*: 8-hr TWA:
0.15 mg/m³

OSHA PEL**: 8-hr TWA:
0.05 mg/m³

Rat, Intraperitoneal,
LDLo: 430 mg/kg

Dog, Oral, LDLo:
1400 mg/kg

* Current (1985-86) ACGIH TLV, as Pb

** Current OSHA PEL (as Pb) with an action level of 0.03 mg/m³
(29 CFR 1910.1025)

SECTION 3. PHYSICAL DATA

Melting Point ... 1646.6°F(897°C) (Begins to Sublime before Melting)

Boiling Point ... 2681.6°F(1472°C) (Decomposes)

Molecular Weight ... 223.2

	<u>Litharge</u>	<u>Massicot</u>
Density	9.53 g/cc	9.6 g/cc
Solubility in Water (@ 25°C)	0.0504 g/L	0.1065 g/L

Appearance and odor: Lead monoxide exists in two crystalline forms: litharge and massicot. The reddish litharge transforms to yellow massicot at 912.2°F(489°C). Lead monoxide is odorless.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

NA

NA

NA

This material is nonflammable. Use whatever extinguishing agents are appropriate for the surrounding fire.

When hot, lead monoxide can act as an oxidizing agent and may intensify combustion.

Toxic dust and fumes may be generated in a fire situation. Fire fighters should wear self-contained breathing apparatus and full protective gear.

SECTION 5. REACTIVITY DATA

Lead monoxide is stable at room temperature. It does not polymerize. When heated and cooled in air it can undergo transitions between crystalline and oxide forms.

Mixtures of lead oxide and chlorinated rubber may react violently when heated. A lead oxide-glycerol mixture (used as cement/jointing compound) can ignite when exposed to fluorine gas and may explode after exposure to perchloric acid fumes. Violent reactions can occur when lead monoxide is heated with aluminum, sodium, zirconium, titanium, boron, or silicon. Other incompatibles include hydrogen trisulfide, metal acetylides, and peroxyformic acid.

Toxic lead fumes can form at high temperatures.

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY, NY 12303-1836 USA
(518) 377-8855



No. 15A

CHRYSTILE ASBESTOS

Date November 1979

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: CHRYSTILE ASBESTOS

DESCRIPTION: A crystalline serpentine mineral, or layered, hydrated magnesium silicate in fine fiber form (asbestiform). The end of a sliver of this material with a cross-section of 0.1 mm² can show about 20 million tubules (scroll-like fibrils about 0.01 µm diameter) in approximate parallel orientation. It is possible to strip from a fiber bundle very fine chrysotile threads, each an agglomerate of hundreds or thousands of hollow fibrils. (90% of asbestos used is chrysotile.)

OTHER DESIGNATIONS: Asbestos, CAS #001 332 214, GE Material D4E11

SECTION II. INGREDIENTS AND HAZARDS

Idealized Chrysotile (unit cell) - Mg₃Si₂O₅(OH)₄*

*Impurities include low levels of Mn, Fe⁺², Fe⁺³, and Al in the structure, replacing randomly 4% av. of the Mg atoms. Impurities depend on the mineral source; the unit cell hydroxyl content can also vary with an average of 4.25.

**Current OSHA TLV. OSHA (1975) proposed TLV of 0.5 fb/cc with a Ceiling of 5 fb/cc (15 min. sample). NIOSH (1976) proposed 0.1 fb/cc. ACGIH (1979 Intended Changes List) has retained TLV of 2 fb/cc for chrysotile asbestos. Asbestos is carcinogenic and/or co-carcinogenic for humans!

ca 95

HAZARD DATA

8-hr TWA 2 fibers/cc,*
Ceiling 10 fibers/cc,
(>5 µm in length)

"Asbestos"
Human, inhal.
TDLo 1.2 fb/cc for
19 years
(Pulmonary effects)

SECTION III. PHYSICAL DATA

Melting point ----- Decomposes (see Sect. V)
Vapor pressure ----- Nil
Water solubility ----- Insoluble (slowly breaks down in hot water)

Appearance: White, fibrous solid, as long flexible textile fibers down to dust-like filler power. [Milled chrysotile asbestos (powder-like) has an aspect ratio (ratio of length/diameter) as high as 50 for most particles.]

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	LOWER	UPPER
N/A	N/A	N/A		

This material is not combustible in air. Use extinguishing media as appropriate for the surrounding materials in a fire situation.

SECTION V. REACTIVITY DATA

This material is inert under ordinary room temperature and heated use conditions. It is resistant to heat, but it will decompose and alter its microscopic fiber structure (see Sect. I) above 600 C (1112 F): Chrysotile dehydroxylates at 600-780 C; the "asbestos anhydride" in turn breaks down to mixture of silica (SiO₂) and forsterite (Mg₂SiO₄) at 800-850 C. Above 1000 C (1832 F) magnesium pyroxenes are formed which melt at about 1450 C.

Strong acids can attack chrysotile and rapidly extract its MgO and H₂O content; it can be decomposed by glacial acetic acid. Hot water slowly breaks down chrysotile. It, like other forms of asbestos, resists strong alkali (5 M NaOH at least up to 100 C).

Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855



GENIUM PUBLISHING CORP.

No. 683

POLYCHLORINATED BIPHENYLS
(PCBs)

Issued: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: POLYCHLORINATED BIPHENYLS (PCBs)

Description (Origin/Uses): Commercial PCBs are mixtures that were once widely manufactured by combining chlorine gas, iron filings, and biphenyls. Their high stability contributes to their intended commercial applications and their accidental, long-term adverse environmental and health effects. PCBs are useful as insulators in electrical equipment because they are electrically nonconductive. Their distribution has been limited since 1976. The Aroclor PCB codes identify PCBs by type. The first two digits of a code indicate whether the PCB contains chlorinated biphenyls (12), chlorinated terphenyls, (54), or both (25, 44); the last two digits indicate the approximate percentage of chlorine. Found in insulating liquid, synthetic rubber, plasticizers, flame retardants, floor tile, printer's ink, paper and fabric coatings, brake linings, paints, automobile body sealants, asphalt, adhesives, electrical capacitors, electrical transformers, vacuum pumps, gas-transmission turbines, heat-transfer fluids, hydraulic fluids, lubricating and cutting oil, copying paper, carbonless copying paper, and fluorescent light ballasts.

Synonym: Chlorodiphenyls

Other Designations (Producer, Trade Name, Nation): Monsanto, Aroclor® (USA, Great Britain); Bayer, Clophen® (German Democratic Republic); Prodelec, Phenoclor®, Pyralene® (France); Kanegafuchi, Kanechlor®, Mitsubishi, Santotherm® (Japan); Caffaro, Fenclor® (Italy).

Trade Name	CAS No.	RTECS No.	Trade Name	CAS No.	RTECS No.	HMIS
Aroclors	01336-36-3	TQ1350000	Aroclor 1242	53469-21-9	TQ1356000	H 1 R 1
Aroclor 1016	12674-11-2	TQ1351000	Aroclor 1248	12672-29-6	TQ1358000	F 1 I 3
Aroclor 1221	11104-28-2	TQ1352000	Aroclor 1254	11097-69-1	TQ1360000	R 0 S 1
Aroclor 1232	11141-16-5	TQ1354000	Aroclor 1260	11096-82-5	TQ1362000	PPG* K 1



Genium

SECTION 2. INGREDIENTS AND HAZARDS/EXPOSURE LIMITS

PCB-42% Chlorine/Aroclor 1242

CAS No. 53469-21-9

OSHA PEL (Skin*)

8-Hr TWA: 1 mg/m³

ACGIH TLV (Skin*), 1988-89

TLV-TWA: 1 mg/m³

PCB-54% Chlorine/Aroclor 1254

CAS No. 11097-69-1

OSHA PEL (Skin*)

8-Hr TWA: 0.5 mg/m³

ACGIH TLV (Skin*), 1988-89

TLV-TWA: 0.5 mg/m³

All PCBs/Aroclors

CAS No. 1336-36-3

NIOSH REL 1977

10-Hour TWA: 0.001mg/m³

Toxicity Data**

Mouse, Oral, LD₅₀: 1900 mg/kg

*This material can be absorbed through intact skin, which contributes to overall exposure.

**See NIOSH, RTECS (Genium ref. 90), at the locations specified in section 1 for additional data with references to tumorigenic, reproductive, mutagenic, and irritative effects.

SECTION 3. PHYSICAL DATA

Boiling Point: Ranges from 527°F (275°C) to 725°F (385°C)

Solubility in Water (%): Insoluble

Pour Point: Ranges from -31°F (-35°C) to 87.8°F (31°C)

% Volatile by Volume: Ranges from 1.2 to 1.6

Molecular Weight (Average): Aroclor 1242: 258 Grams/Mole

Aroclor 1254: 326 Grams/Mole

Appearance and Odor: Clear to light yellow mobile oil to a sticky resin; a sweet "aromatic" odor. As the percentage of chlorine increases, the PCB becomes thicker and heavier; e.g., Aroclor 1254 is more viscous than Aroclor 1242.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point*

Autoignition Temperature: Not Found

LEL: Not Found

UEL: Not Found

Extinguishing Media: Use water spray/fog, carbon dioxide (CO₂), dry chemical, or "alcohol" foam to extinguish fires that involve polychlorinated biphenyls. Although it is very difficult to ignite PCBs, they are often mixed with more flammable materials (oils, solvents, etc.)

Unusual Fire or Explosion Hazards: If a transformer containing PCBs is involved in a fire, its owner may be required to report the incident to appropriate authorities. Consult and follow all pertinent Federal, state, and local regulations. **Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode; fire fighters must also wear a complete set of protective clothing. **Comments:** The hazards of PCB fires are associated with the possibility of their being released into the environment where they and their products of degeneration can pose serious long-term health risks. These potential problems are heightened by the PCBs' resistance to biological and chemical degradation and by the possibility that they will contaminate underground water systems (see sect. 5)

*Ranges from 284°F (140°C) to 392°F (200°C).

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Polychlorinated biphenyls are very stable materials. Hazardous polymerization cannot occur.

Chemical Incompatibilities: PCBs can react dangerously with sodium or potassium. These reactions are part of an industrial process used to destroy PCBs; however, people have been killed by explosions at PCB treatment, storage, and disposal sites. Conditions to

Avoid: Limit human exposure to PCBs to the lowest possible level; especially avoid contact with skin. **Hazardous Products of Decomposition:** Thermal-oxidative degradation of PCBs can produce toxic gases such as carbon monoxide, chlorine, chlorinated aromatic fragments, phenolics, aldehydes, and hydrogen chloride. Incomplete combustion of PCBs produces toxic compounds such as polychlorinated dibenzofuran (PCDF, the major product of combustion), and polychlorinated dibenzo-*p*-dioxin (PCDD or dioxin).

APPENDIX D
EXCAVATION PROCEDURES



OHM Corporation

HEALTH & SAFETY PROCEDURES

EXCAVATION

PROCEDURE NUMBER 28

Page 1 of 8

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) will control the hazards posed by open excavation through strict compliance with this procedure and the provisions of the excavation permit.

2. SCOPE, APPLICATION AND PURPOSE

This procedure outlines requirements for all open excavations made in the earth's surface. Excavations are defined to include trenches. This policy is intended to protect personnel from the hazards of collapse.

3. REGULATORY REQUIREMENTS

This procedure will follow the guidelines of 29 CFR 1926, Subpart P - Excavations. In the case of United States Army Corp of Engineers projects, the requirements of EM 385-1-1, Section 23 will be observed. In the event of a conflict between these referenced standards, the more stringent will prevail.

4. GENERAL REQUIREMENTS

Safety operations while working in and around excavations involve many factors. Factors to be evaluated and discussed before starting work at daily safety meetings include:

4.1 Surface Encumbrances

All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary to safeguard employees.

4.2 Underground Installations/Utility Locations

The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

- 4.2.1 Utility companies or the state utility protection service shall be contacted at least two (2) working days prior to excavation activities to be advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation.
- 4.2.2 OHM personnel and sub-contractors should be careful to protect and preserve the markings of approximate locations of facilities until the markings are no longer required for safe and proper excavations.
- 4.2.3 If the markings of utility locations are destroyed or removed before excavation commences or is completed, the OHM competent person must notify the utility company or utility protection service to inform them that the markings have been destroyed. Normally, it will take two (2) working days of the notice for the utility protection service to remark the locations.
- 4.2.4 OHM equipment operators shall maintain a reasonable clearance between any underground utility and the cutting edge or point of powered equipment.
- 4.2.5 When excavating with powered equipment within 18 inches of the markings of underground facilities, personnel should conduct the excavation in a careful and prudent manner, excavating by hand to determine the precise location of the facility/utility and to prevent damage.
- 4.2.6 While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

4.3 ACCESS AND EGRESS

4.3.1 Structural Ramps

Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

Structural members used for ramps and runways shall be of uniform thickness.

Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

4.3.2 Means of Egress from Trench Excavations

A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees.

4.4 EXPOSURE TO VEHICULAR TRAFFIC

Employees exposed to public vehicular traffic shall be provided with and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

4.5 EXPOSURE TO FALLING LOADS

No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with 29 CFR 1926.601(b)(6), to provide adequate protection for the operator from falling objects during loading and unloading operations.

4.6 WARNING SYSTEM FOR MOBILE EQUIPMENT

When mobile equipment is operated adjacent to an excavation or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals or stop logs. If possible, the grade should be away from the excavation.

4.7 HAZARDOUS ATMOSPHERES**4.7.1 Testing and Controls**

In addition to the requirements set forth, 29 CFR 1926.50 - 1926.107; to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are suspected, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet in depth.

Adequate precautions shall be taken, to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation as needed.

Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 10 percent of the lower explosive limit (LEL) of the gas or vapor. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

4.7.2 Emergency Rescue Equipment

Emergency rescue equipment, such as self contained breathing apparatus (SCBA), a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

Employees entering bell-bottom pier holes or other similar deep and confined excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

4.8 PROTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION

Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

If excavation work interrupts the natural drainage of surface water (such as streams); diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to run-off from heavy rains will require an inspection by a competent person.

4.9 STABILITY OF ADJACENT STRUCTURES

Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

- 4.9.1 A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
- 4.9.2 The excavation is in stable rock; or
- 4.9.3 A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or
- 4.9.4 A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

- 4.9.5 Sidewalks, pavements, and other structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

4.10 PROTECTION OF EMPLOYEES FROM LOOSE ROCK OR SOIL

Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the excavation face to stop and contain falling material; or other means that provide equivalent protection.

Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

4.11 INSPECTIONS

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are required when employee exposure can be reasonably anticipated. An Excavation/Trenching Permit must be completed by the competent person to document the inspections.

Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

4.12 FALL PROTECTION

Where employees or equipment are required or permitted to cross over excavations; walkways, or bridges with standard guardrails shall be provided.

Adequate barrier for physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc. shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc., shall be covered or backfilled.

5. SOIL CLASSIFICATION

OSHA Soil Classification (Appendix A to Subpart P)

5.1 Type A means:

Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

- 5.1.1 The soil is fissured; or
- 5.1.2 The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- 5.1.3 The soil has been previously disturbed; or
- 5.1.4 The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- 5.1.5 The material is subjected to other factors that would require it to be classified as a less stable material.

5.2 Type B means:

- 5.2.1 Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- 5.2.2 Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- 5.2.3 Previously disturbed soils except those which would otherwise be classed by Type C soil.
- 5.2.4 Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subjected to vibration; or

- 5.2.5 Dry rock that is not stable; or
 - 5.2.6 Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1H), but only if the material would otherwise be classified as Type B.
- 5.3 Type C means:
- 5.3.1 Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
 - 5.3.2 Granular soils including gravel, sand, and loamy sand; or
 - 5.3.3 Submerged soil or soil from which water is freely seeping; or
 - 5.3.4 Submerged rock that is not stable; or
 - 5.3.5 Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

TIMBER SHORING, ALUMINUM HYDRAULIC AND ALTERNATIVES TO SHORING

Refer to 29 CFR 1926 Subpart P (Appendices C, D, and E) for details on shoring, shields, and trench boxes.

7. SELECTION OF PROTECTIVE SYSTEMS

Refer to 29 CFR 1926 Subpart P (Appendix F) for the decision logic in selecting protective systems.

8. PERMITS

An Excavation/Trenching Permit must be completed by the competent person each day that an excavation is open and personnel may be required to enter the excavation. The excavation permit follows this procedure.

APPENDIX E
CONTINGENCY PLAN